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STUDY PROJECT

COGNITIVE FRAMES OF REFERENCE AND STRATEGIC THINKING

BY

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ABSTRACT

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Cognitive Frames of Reference and Strategic Thinking

In the past decade, a growing body of research has explored the unique requirements of leadership at the highest organizational levels. Authors use terms such as *executive* and *strategic* interchangeably to characterize leadership at the organization's apex. Underlying this scholarly work is a practical recognition that strategic leadership requirements differ substantively from the requirements faced by leaders at lower levels. These differences have significant implications for the selection, training, and development of leaders in all types of organizations.

This research tradition places leadership in a broader organizational context in order to understand differences in the nature of work at successive levels within the organization and the concomitant leadership requirements of each level. Researchers assume that if the critical tasks of leadership vary by level, then the skill requirements of leaders also vary by level.[1] Research has resulted in the categorization of organizational levels based on the nature of work, the identification of leadership tasks at each level, and the specification of leadership requirements for each level.[2]

Organizational leadership research highlights the increased importance of conceptual skills as one moves up

the hierarchy. At the strategic level, leadership requirements include environmental scanning, envisioning, complexity reduction, strategy formulation, and decision making under conditions of uncertainty.[3] Not only are conceptual skills more important than technical skills at higher levels, but higher levels also call for more sophisticated conceptual activity. Especially in large, complex organizations, the task demands placed on strategic-level leaders are enormous. Planning time frames extend well into the future, sometimes as far as twenty to fifty years.[4] The leader faces a strategic environment that is multifaceted and characterized by increased complexity, ambiguity, and uncertainty.[5]

The *ability to organize and understand experience* underlies these conceptual skills. Extended time frames characteristic of strategic-level work also require the leader to make sense out of events in the yet unexperienced future. Research on the conceptual requirements of strategic leadership points to the importance of cognitive structures (also know as mental maps, frames of reference, schemata, representations, and scripts) in constructing meaning from experience.[6]

While previous researchers have identified the importance of cognitive structures, little research has been devoted to understanding the organization and content of the structures that leaders actually possess.[7] What do these cognitive structures look like? Are there discernable,

patterned differences in the way in which leaders at different levels construct a framework for understanding the strategic environment and formulating actions to shape the future? If so, in what ways are their cognitive structures different? The goal of the present study is to explore the answers to these questions.

CONCEPTUAL FRAMEWORK

The conceptual framework for this study comes from two related lines of inquiry. The first is the work of Elliot Jaques and T. O. Jacobs, whose Stratified Systems Theory (SST) links leadership requirements to organizational functions. SST emphasizes the relationship between the conceptual requirements of leadership and the task demands of various organizational levels. The second line of inquiry concerns the nature of expertise. The expertise literature suggests the kinds of differences that we might find when comparing cognitive structures of leaders at different organizational levels while they are doing tasks characteristic of the strategic level. In the following paragraphs, I review this literature as it relates to the present study.

Stratified Systems Theory

Theoretical Concepts. Stratified Systems Theory is built on an understanding of the nature and structure of organizational work. According to the theory, work is

organized hierarchically into discrete strata, where each stratum has its own set of critical tasks. The time spans associated with accomplishment of the critical tasks distinguish the strata: the longer the completion time, the higher the level of work.

Lewis and Jacobs recently have taken exception to the reliance on time spans as a means of differentiating strata.[9] They agree with SST that the nature of work differs by strata, but they are less enthusiastic about the concept of time span as the critical variable distinguishing work across levels. They point out that time spans at the strategic level may become compressed under certain circumstances; therefore, they suggest that progressively more sophisticated thinking processes may be the most important criterion for distinguishing organizational strata. Other scholars have made a similar argument for a more flexible interpretation of time span.[10]

Based on SST, Jacobs and Jaques define leadership as a discretionary process that gives purpose and direction to the expenditure of effort directed toward accomplishing organizational goals. Organizational leaders exercise leadership by means appropriate for their level, but regardless of level, all leaders add value to the extent that they contribute to organizational survival. The cognitive requirements of leaders are associated with the critical tasks of their level of the organization and the

functions that those tasks perform in contributing to organizational survival.

Jacobs and Jaques suggest that leadership results from an interpretative process that reduces uncertainty about what actions to take in a particular situation. Central to the theory is the construct of a *frame of reference*, which is a cognitive structure (mental map) for understanding information relevant to a specific situation. The map consists of interconnected elements that are salient for the leader. A frame of reference is analogous to the concepts of schemata and cognitive representation found in the cognitive science literature. Frames of reference are based on knowledge and experience and provide the basis for understanding cause and effect in situations. Complexity of the frame of reference is a function of the number of elements and the number of interconnections between elements in the mental map. When a leader's frame of reference is sufficiently complex to match the complexity of a particular task, then the leader is able to understand the situation and that understanding becomes the basis for decisions concerning action. Hence, at any given level of the organization, frames of reference sufficiently complex for the tasks of that level are prerequisite for effective leadership.

Table 1 lists seven organizational strata grouped into three broader functional domains--production, organizational, and systems--with military referents.[11] The

domains represent major differences in the complexity and level of abstraction associated with the critical tasks of work.

Cognitive Requirements. What are the cognitive requirements associated with leadership tasks for each domain in the model? In general, cognitive requirements increase as one moves from the production domain to the systems domain. Cognitive requirements increase because the tasks at higher levels involve a greater number of elements, more interdependence between elements, and, in some cases, longer time spans.

In the production domain, cognitive requirements involve concrete frames of reference associated with the technology of work and the people employed to do the work. Conceptual work is primarily analytical. Decisions involve relatively short time spans and are associated with the application of physical and human resources to the current production function.

Cognitive requirements of the organizational domain involve the need to understand causality. Work is more complex because of increases in the number of elements of work and longer time spans. Frames of reference must be complex, enabling the leader to engage in more sophisticated analytical thought. Critical decisions involve what production will be undertaken and when, rather than how production will be managed.

Table 1

Organizational Strata and Functional Domains

Stratum	Time Span	Functional Domain
VII Corporation 4-star general	20 years	Systems -unbounded environment -outward focus -create complex systems -envision future -build consensus -create culture
VI Group some 3-star generals	10 years	-oversee complex systems
V Company 2-star general	5 years	Organizational -exist within bounded open system -manage one complex system
IV Division brigade commander	2 years	-oversee operating sub-systems
III Department battalion commander	1 year	Production -direct one operating sub-system -bounded within larger system -face-to-face
II Section company commander	3 months	-direct tasks
I Shop Floor troops	3 months or less	-perform tasks

In the systems domain, which is where strategic leadership occurs, time spans extend ten to twenty years into the future. The critical conceptual work at this level is based on synthesis, rather than analysis. The relevant elements of work exist primarily beyond the organization's boundaries. The leader's task is to determine desirable and feasible futures and to take steps to shape the preferred future. Frames of reference must be exceedingly complex, permitting uncertainty reduction when the external environment is highly uncertain. Critical decisions involve the interpretation of the organization's future and the selection of actions to shape the desired future. This requirement captures the popular notion of executive vision.

Research Findings. Using SST as a framework, Jaques, Clement, Rigby, and Jacobs conducted interviews with 68 Army executives, both military and civilian, to identify executive leadership requirements, including associated frames of reference and critical knowledge and skills.[12] Military executives included three- and four-star generals (strata VI and VII, respectively); civilian executives were members of the Senior Executive Service. Respondents described the nature of their work and the important attributes of an incumbent.

In terms of the cognitive requirements of military executives, the findings revealed similar requirements of both three- and four-star generals, although the competencies required of the three-star generals were not at

as high a level and were more technically focused. Cognitive leadership requirements involved complex frames of reference that included knowledge of international affairs; combined and joint-service operations; strategy as it relates to national objectives; tactical and training doctrine; and government, politics, and economics. These frames of reference formed the knowledge structures for envisioning the long-term future of the Army and for setting in motion programs and policies to realize the vision. The results were much less specific with regard to the structural properties of the frames of reference and how executives used their frames of reference when engaged in strategic thinking. The authors mentioned the use of heuristics and complex model building, but did not relate these cognitive processes to the structure and content of the frames of reference.

In an extension of SST, Jaques and Clement (cited in Lewis and Jacobs) suggested that progressively more sophisticated frames of reference and thinking processes are associated with higher organizational levels.[13] Sophistication involves two dimensions--the level of abstraction of the elements in the frame of reference and the way in which the elements are put together when engaged in thought. At lower levels of abstraction, the elements of the frame of reference have concrete referents; at higher levels, the elements represent abstractions that do not relate directly to concrete objects. For example, in an

Army battalion (stratum III), the commander uses vehicle maintenance data and repair parts inventory to gauge unit readiness. Both maintenance data and repair parts inventory are symbols with concrete referents. In contrast, the four-star general (stratum VII) uses the national industrial infrastructure and the shifting technological base, both abstractions without concrete referents, in considering readiness ten to twenty years in the future.

Four hierarchically ordered thinking processes form the other dimension. The simplest process is declarative, where assertions are made without supporting evidence (e.g., "the Soviet Union is a threat to the U.S."). The next process involves assertions supported by relevant data. Rather than merely asserting an idea, conclusions are reached on the basis of supporting evidence (e.g., "the Soviet Union is a threat because they are the only country that has the nuclear weapons to destroy the United States.") The next level involves serial processing. Elements are put together in sequential order and are connected in time leading to a logical conclusion. For example,

> The Soviet Union used to be a major threat to the U.S. because of their expansionist policies and their nuclear capability. Now, with their internal problems, they appear less concerned with world-wide expansion and are concentrating instead on domestic problems. Although they still possess the nuclear weapons, the likelihood that they will use them has diminished greatly.

Finally, the most sophisticated level involves parallel processing, where elements are organized into several

separate but linked serial processes and dealt with in parallel. Explicit connections are made among ongoing processes. For example,

> To understand the Soviet Union, you must understand two competing forces--pressures for increased openness and pressures for control. They must become a more open society because they need the high technology transfer and information exchange necessary to maintain superpower status. And the central government must maintain some degree of control because if it doesn't, the union may disintegrate into separate republics. The problem is that openness potentially diminishes the control of the central government. This is not problem in a democracy, where the social and political institutions draw their strength from an open society. But seventy plus years of communist rule have not produced such institutions. One solution is for them to sacrifice openness for control; another is to sacrifice control for openness. More than likely, they will take a middle ground, making short term tradeoffs on each for long term gains. They may have to give up the Baltics in order to maintain openness and preserve other elements of the union. Clearly, they are in for some unstable times in the near future.

This extension of SST suggests that strategic leaders are more likely to have frames of reference with abstract elements. Moreover, strategic leaders' frames of reference should permit more sequential and parallel processing than those of leaders at lower organizational levels.

Expertise

The organizational leadership framework presented above asserts that the conceptual nature of work varies across organizational levels, with higher levels demanding greater conceptual skills based on more complex, well organized

cognitive structures. An alternative way to look at this phenomenon is in terms of the expertise required to accomplish the leadership tasks at various organizational levels, where expert performance is "characterized by rapid access to an organized body of conceptual and procedural knowledge."[14] When leaders at lower organizational levels are given tasks characteristic of work at higher levels, they should demonstrate less expertise than those who occupy more senior positions. (This assertion assumes that the incumbents of the more senior positions are capable of performing the conceptual tasks required of their positions.) The literature on the nature of expertise suggests a number of potential differences between the cognitive structures of people with varying degrees of expertise.

Glaser offers a number of generalizations concerning the nature of expertise based on a review of this vast literature.[15] Several generalizations bear directly on the current study and are summarized below.

First, expertise develops over time as a function of experience. Its development is influenced by the demands of the tasks one faces in the course of experience.

Second, expertise is specific. Expertise in one domain does not guarantee expertise in others. Some task domains may be more generalizable so that some forms of expertise may be transferable across domains.

Third, a distinguishing feature of experts, when compared to novices, is the way they organize knowledge. Experts' knowledge is extensive and well organized around inferences about principles and abstractions which subsume literal objects and events. In contrast, novices' knowledge representations are less detailed and organized around literal or surface features of a problem or situation. When categorizing problems, novices do it in terms of the surface features (e.g., novice physics students classify problems as a spring problem or an inclined plane problem) while experts classify problems in terms of higher-level applicable principles (e.g., conservation of energy problem).

Fourth, experts develop an ability to perceive large meaningful patterns, which are encountered in the course of everyday activities in the task domain. Novices perceive smaller, more literal patterns. Pattern recognition is a function of the knowledge structures, hence the expert-novice differences.

Finally, knowledge of experts is highly procedural and goal oriented. Concepts are tied directly to procedures for their application in real world settings. Experts and novices may be equally good at recalling small specific elements of their knowledge structure, but experts are better able to relate these elements to cause and effect sequences. This leads to goal directed action.

Much of the research on the nature of expertise that formed the basis for these generalizations comes from

studies of expert-novice differences in well-defined domains of knowledge, such as chess,[16] physics,[17] and financial planning.[18] Very little research has been conducted using ill-structured, open-ended domains such as those associated with tasks faced by strategic leaders.[19]

Purpose of the Study

This study explores the differences in the nature of the frames of reference that military leaders at different levels use when engaged in a conceptual task associated with strategic-level leadership--identifying strategic issues. Cowan, Fiol, and Walsh have suggested that understanding strategic issues is an important task of strategic leaders.[20] How do military leaders construct an understanding of strategic issues facing the military establishment in the future? When asked to think aloud about strategic issues facing the American military in the next ten to twenty years and to propose actions that the defense establishment should take to shape the future in light of those issues, what is the organization of the frames of reference underlying their thinking?

What might we expect to find? SST and the expertise literature suggest that, when compared to leaders at lower organizational levels, strategic-level leaders are more likely to reveal:

1. complex frames of reference organized around abstract principles and concepts, which are structured with cause and effect sequences;

2. sophisticated thinking processes that involve parallel processing; and

3. an orientation that looks outward toward the organization's environment and is proactive rather than reactive.

METHOD

Subjects

A total of twenty subjects participated in the study, which was conducted between November 1990 and February 1991. Participants represent three distinct groups. One group is composed of ten U.S. Army War College students, Lieutenant Colonels with recent battalion command experience, selected at random from the pool of active duty U.S. Army officers enrolled in the class of 1991. The average length of service of the group is 21 years. Eight of the students hold masters degrees and five have served on the Army Staff or on the staff of a major command. Group members (nine males and one female) represent nine branches of the Army. In terms of SST, this group represents officers with leadership experience characteristic of stratum III (last level in the production domain) who, because of their selection for the war college, are making the transition to stratum IV (first level in the organizational domain). Jacobs (as presented in Lewis and Jacobs) reported research findings that support this assertion. In interviews with war college students, he found that the lowest level of work

capacity was at stratum III, with many subjects capable of work at stratum IV.[21]

The second group, a convenience sample of strategic-level leaders, is made up of five flag officers--two Army four-star generals, one Navy four-star admiral, and one each Army three- and two-star general. Although SST classifies two-star generals in stratum V, the last level of the organizational domain, this particular person occupied a position on the Army Staff where the nature of work was more characteristic of stratum VI (e.g., time spans beyond five years). The two four-star generals and the four-star admiral have experience as Commanders in Chief of unified or specified commands. The average length of service for group members is thirty-two years. Four of the five officers hold masters degrees. Each served on the Joint Staff or on the staff of their respective service before advancing to flag rank.

The third group, a convenience sample of content experts in regional studies and military strategy, is made up of five members of the Army War College faculty. This group makes it possible to compare frames of reference based primarily on experience and organizational level with frames of reference based primarily on formal academic knowledge (technical expertise). Four faculty members are U.S. Army officers; one is a civilian with considerable experience in the national defense establishment. The average length of service for the four Army officers (three Colonels and one

Lieutenant Colonel, all males) is 23 years and 11 months. Three members of the group have Ph.D. degrees; the remaining two members have masters degrees. Three served on the Army Staff or the Joint Staff sometime during their careers.

Interview Format and Data Collection

I contacted each subject prior to the interview to arrange a convenient location and time. During this initial contact, I described the general nature of the study, but I did not mention the specific topics in order to preclude preparation and to provide some degree of control over the interview procedure.

A semistructured interview protocol (Appendix A) provided the mechanism for prompting thinking about future strategic issues facing the military. I recorded each interview on audio tape and typed verbatim transcripts of each interview for the subsequent analysis. On average, each interview lasted one hour. Before the interview, each subject read and signed a consent form that explained the ethical considerations involved in the research and authorized the use of the interview for purposes of the study.

I began each interview with a series of background questions in order to learn about the respondent's education and experience (For the flag officers, I obtained this information from biographical sketches in order to maximize the time devoted to the discussion of strategic issues.) The interview protocol contained five sections. In the

first section, participants responded to the following three open-ended questions about global issues: (a) What are the most significant strategic issues facing the U.S. military in the next ten to twenty years? (b) Why are the issues significant? (c) How should the military go about posturing itself to face these issues? The first two questions elicited frames of reference used by respondents to understand the strategic environment. This provided insight into how they structure their understanding of the future. The third question elicited action-oriented frames of reference--how respondents would shape the future. The questions were intentionally open-ended because strategic thinking is inherently open-ended. I used the ten to twenty year time span in order to correspond to the requirements of strategic-level leadership. Open-ended questions also helped me avoid imposing my own frames of reference on the respondents' thinking. In that vein, I also used the respondent's concepts when summarizing or asking follow-on questions during the interview.

The next three sections of the interview followed a similar pattern of questioning, but focused on three specific regions of the world--the Soviet Union and Eastern Europe, Latin America, and Africa. These regions provided a range of possible strategic issues relevant to U.S. national security strategy. For the student group, regional questions were presented in random order. Subsequent analysis revealed no order effects. The final section

included the same three questions with respect to domestic issues and their impact on national military strategy.

Data Analysis

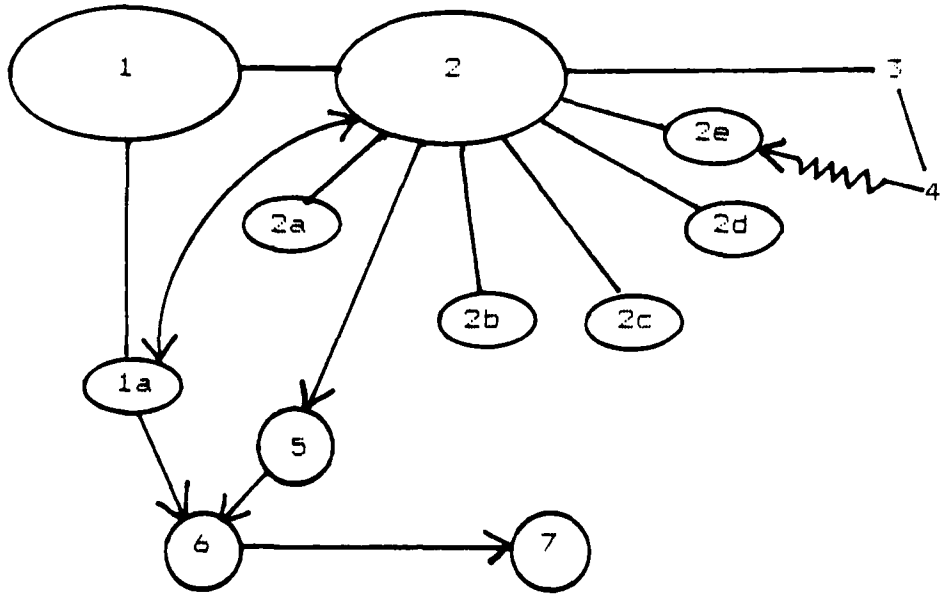
The twenty interviews yielded over 260 single-spaced pages of text. Analysis of the interviews involved three phases--diagraming the frames of reference, analyzing the frames of reference associated with strategic issues, and analyzing the frames of reference associated with actions.

Diagraming the Frames of Reference. The first phase in the analysis involved the reduction of the text data to frame-of-reference diagrams. For each transcript, I diagramed an issues frame of reference and an actions frame of reference for each section of the interview--global, regional (three), and domestic. This yielded a total of ten frame-of-reference diagrams for each subject--two for each of five sections. A number of respondents stated that there were no significant strategic issues with respect to a particular region. Furthermore, time demands prevented two of the flag officers from completing the interview. Consequently, I relied on a total of 189 diagrams (out of 200 possible) for the subsequent analyses.

Figure 1 illustrates a sample issues frame-of-reference diagram, along with the symbolic conventions used to represent the structure and content of the interview text. The frame of reference contains both concept networks and causal networks associated with the issues. Elements of the frame of reference include major issues (1 and 2), subissues

Figure 1

Sample Frame-of-Reference Diagram



1. Budget and Deficit
1a. Military Spending

2. Social Issues
2a. homeless
2b. education
2c. conditions in the cities
2d. poverty level
2e. war on drugs

3. "My concern is what is the strategy for these programs? We spend a lot of time talking about what the military strategy is and where we are going 10 to 20 years down the road. I'm not sure the same strategy has been defined or laid out...with many of these social programs."

4. "It seems no matter how much we spend, it is never enough and there doesn't seem to be a lot of effectiveness...The war on drugs is a good example."

5. Our national will and the fabric of our society.

6. Overall security and welfare of the nation.

7. The U.S.A. as a world power.

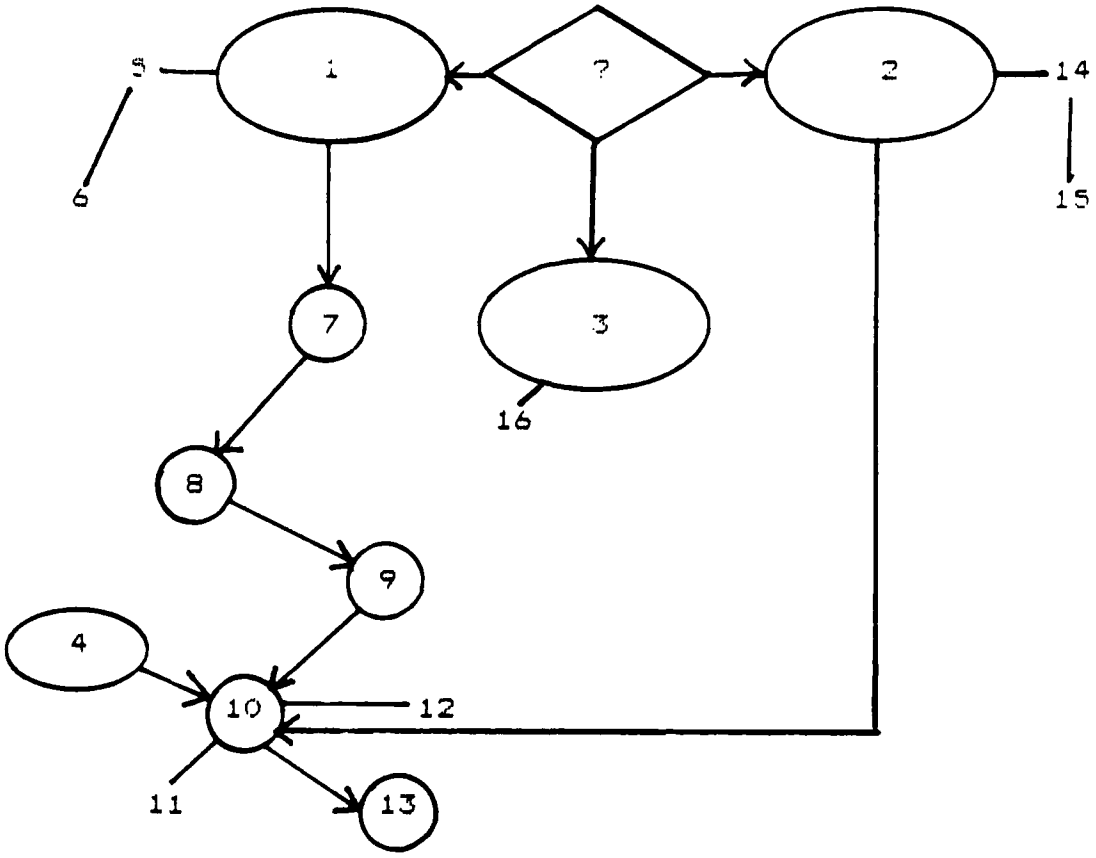
(1a and 2a-2e), declarative information such as facts or opinions (3 and 4), and causes and effects that flow from the issues (5, 6, and 7). Squiggly arrows denote examples. In this case, subissue 2e (the war on drugs) is mentioned as an example of an ineffective program (4). Single-headed arrows link elements to denote cause and effect relationships. For example, social issues (2) can erode the national will and the fabric of society (5), which have an effect on the security and welfare of the nation (6), which ultimately influences our nation's status as a world power (7). Double-headed arrows denote tradeoffs. In this case, the respondent saw a tradeoff between military spending and spending to solve social issues. Here is how the respondent articulated the tradeoff,

> There is much discussion now that too much money has been spent on the military in the past years, specifically during the so-called Reagan buildup years, and that now the focus should change from military spending to social spending, to social programs... Certainly the military spending, the defense spending needs to be integrated into the budget with all these other programs and what piece goes to what can certainly be looked at and adjusted.

Figure 2 illustrates a portion of another frame of reference diagram with an additional convention, a diamond, to illustrate a question or decision. This convention is useful for diagraming parallel processing because it permits the representation of multiple, interconnected paths (e.g., alternative answers to a question or alternative courses of action for a decision).

Figure 2

Sample Diagram--Parallel Processing



? "If you get a decision tree, a branches and sequences type of thing on the Soviet Union, you soon find that you are in the nth dimension of possibilities. But let's just take two branches."

1. "What Gorbachev is trying to do in the Soviet Union will be turned around."

2. "Disintegration of the Soviet Union into splinters."

3. "I suspect that we will see a branch that is somewhere in between."

Analysis of Issues. After completing the diagrams, the next phase involved the analysis of the structure and the content of the issues diagrams. First, I analyzed the structural features of each frame of reference. The structure of a frame of reference includes three components--complexity, sophistication, and causal networks. Complexity is a function of the number of elements and the number of connections among elements in the framework. The more elements and the more connections, the greater the complexity. Sophistication includes two components that I derived from SST (level of abstraction and types of thinking processes) and two components that emerged from the data (contingent thinking and tradeoffs). For each diagram, I assessed the extent to which issues represented concrete or abstract referents. In addition, I looked for the presence of parallel processing, the presence of if-then statements (contingent thinking), and the presence of tradeoffs (e.g., "the level of defense spending affects the level of domestic spending and vice versa"). Finally, I looked at causal networks in terms of the number of causal links and the number of elements in the longest causal chain. Causal networking provides an indication of the respondent's ability to assess second- and third-order effects.

Content analysis of the issues involved sorting issues into content categories. Moreover, I assessed the orientation of the frames of reference in terms of the focus

(internal or external) and the degree to which the issues were proactive or reactive.

Analysis of Actions. The final phase involved an analysis of the action frames of reference. For this analysis, I repeated the procedures for analyzing structure and content mentioned above, this time focusing on the frames of reference associated with actions.

RESULTS

Strategic Issues Frames of Reference

Structure. Structural analysis of the issues frames of reference focused on three features--complexity, sophistication, and causal networks.

Complexity. In terms of complexity, the three groups did not differ with regard to the number of elements in the frames of reference. Differences in the number of elements was more a function of topic than group membership. That is, across all groups, frames of reference for the Soviet Union and Eastern Europe contained more elements that did frames of reference for Latin America and Africa. African frames of reference were particularly sparse because there was a perceived absence of strategic issues with regard to Africa, as well as a lack of knowledge about the region. As I expected, the regional experts tended to have frames of reference with more elements for their area of expertise than any of the other subjects. However, when discussing

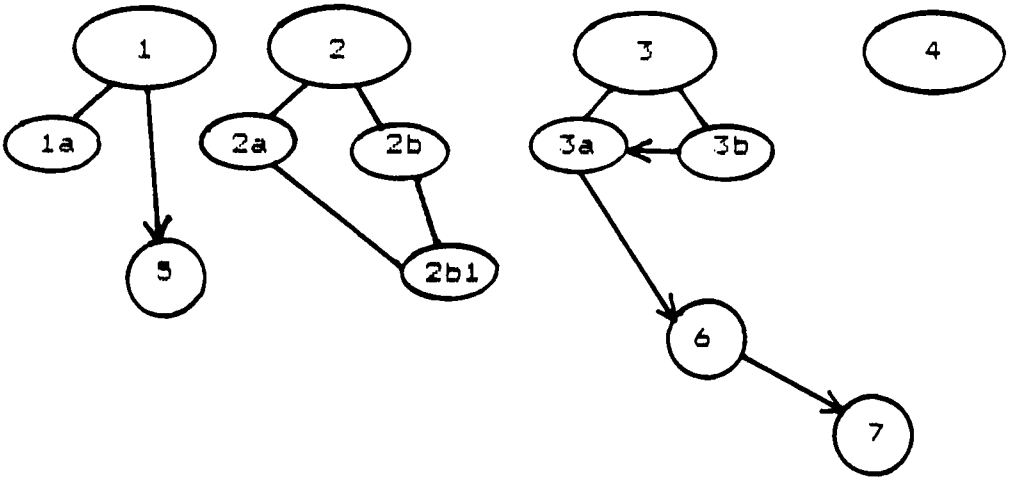
other regions, the size of their frames of reference was similar to all other respondents.

The groups did differ on the degree of connectedness between the elements in the frames of reference. The flag officers' (strategic leaders) and the regional experts' frames of reference were substantially more interconnected than those of students. I assessed interconnectedness in terms of the ratio of links between elements compared to the total number of elements in the frame of reference. The larger the ratio, the greater the interconnectedness. Twenty-six percent of the students' frames of reference had interconnection ratios equal to or greater than one, compared with 60% for the flag officers and 56% for the regional experts. *Figure 3 presents two frame-of-reference* diagrams to illustrate differences in interconnectedness. The top diagram came from a student while the bottom diagram came from a flag officer. Both diagrams deal with the same topic.

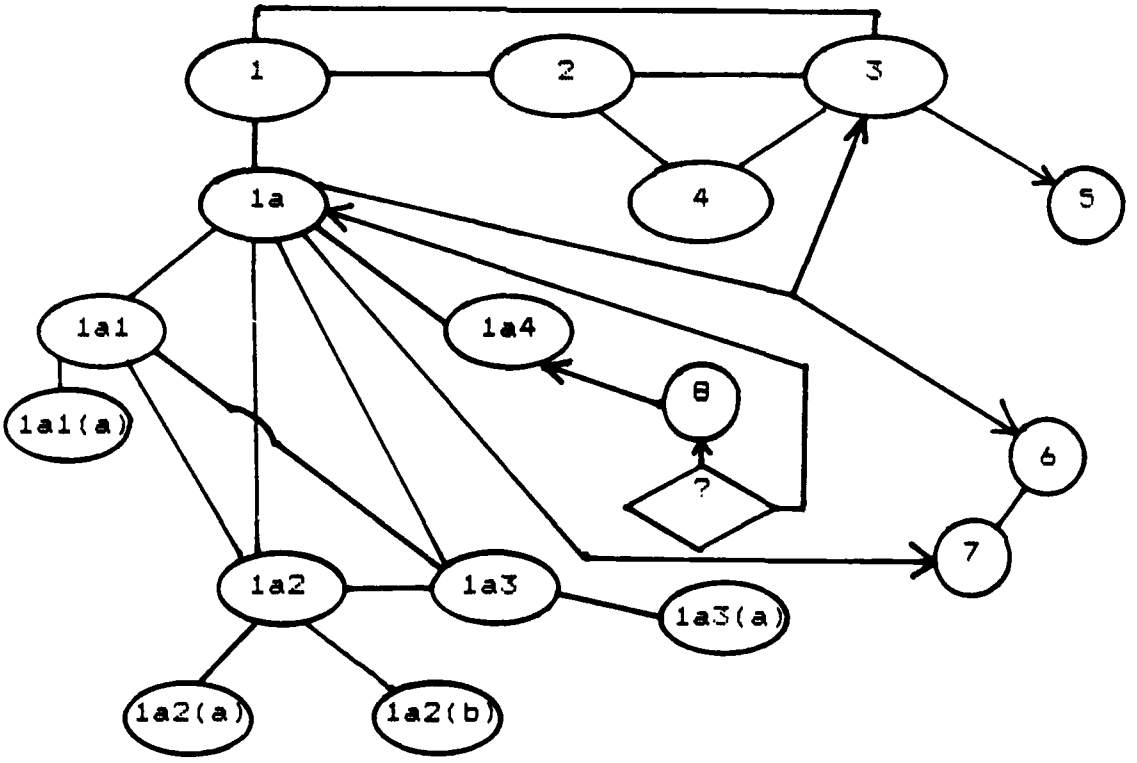
Sophistication. The groups also differed with respect to the degree of sophistication manifested in the frames of reference. Flag officers showed more sophisticated thinking than either students or experts. For flag officers, 62% of the issues frames of reference contained at least one of the following elements: parallel processing, contingent thinking, or tradeoffs. This compares with 34% for the students and 40% for the regional experts. All flag officers engaged in parallel processing sometime during the

Figure 3

Sample Frame-of-Reference Diagrams:
Interconnectedness



3a. Simple



3b. Complex

interview, either in discussing issues (60%) or actions (80%). In contrast, none of the students or regional experts engaged in parallel processing at any time during the interview.

A qualitative analysis revealed no noticeable differences between the groups in the abstractness of the concepts they used to represent the issues. Respondents started out talking about abstract issues. As the discussion progressed, they added details and examples as subissues.

Causal Networks. There also were no noticeable differences between groups in the causal networks represented in the issues frames of reference. The number of causal links was more a function of the number of elements in the frame of reference than it was a function of group membership. As mentioned above, the number of elements varied by topic, but not by group.

Content. Issues formed nine separate content categories. Table 2 shows the categories and percentage of issues classified in each category for each group. All groups agreed on the importance of economic and social issues, which cut across all five topical areas. Economic issues included the federal budget deficit, our access to world markets and raw materials, and the widening international economic gap. Social issues involved education, drugs, poverty, migration, and demographics.

Table 2

Content Categories for Issues

Category	Group		
	Students	Regional Experts	Flag Officers
	(percentages)		
External Issues	5	20	32
Strategy/ Military Structure	10	4	1
Threat	21	9	18
Economic	23	25	25
Social	22	20	18
Political/ Legal	10	14	5
Environmental	3	3	0
Spacial/ Geographical	6	5	1

The category labeled "external issues" represents a proactive orientation toward the organizational environment, suggesting a willingness to "act on" environmental elements rather than react to them. Issues in this category include shaping a vision of the military and insuring the availability of important resources (capital, public support, national will, financial, and manpower). These issues reflect the interdependence between the military organization and the relevant features of its environment. This was the largest category of issues for the flag officers (32%). The regional experts mentioned issues in this category 20% of the time while only 5% of the students' issues represented this category. Most of these issues surfaced in the discussion of global and domestic topics. The flag officers tended to regard force reductions as given. They defined strategic issues in terms of factors that impact on the force in the future. Listed below are examples of these global issues in the strategic leaders' own words:

> Articulation to the American people and the Congress of the importance of national defense.
>
> The potential disintegration of the military industrial production base as well as the research and development base. If other societies develop overmatched weapons more quickly than we do, or if other societies have the ability to rapidly produce and we destroy our ability to produce at all, then we are in big trouble.

> What should the Army look like in twenty years? Will we shape its change or will it simply evolve?
>
> If we become obsessed with war fighting and we say, "Well, we are going to be trained and ready and lethal and deployable and we are going to have new tanks and all that," we also may be absolutely isolated.
>
> We have to make a decision whether we are committed, and it's in our best interest to maintain a position of world leadership, global presence.
>
> Getting the doctrine straight, getting enough money to get the equipment that makes the doctrine realizable or doable, and organizing that equipment internally in order to carry out the strategic missions. That is the challenge for the year 2000 to 2020. What makes those so significant is that at the moment, the procurement money that is seen in the 7-year program-budget world up to 1997 is insufficient to buy the relevant equipment necessary to carry out the visualization of the doctrine.

In contrast, the students tended to be reactive. For example, in discussing global issues, students emphasized issues associated with defining the threat and responding to it with force structure changes. Students were also more concerned with issues of strategy and structure than were the flag officers and regional experts. The following examples of global strategic issues offered by students illustrate these points:

> To develop a strategy with projected force structure...determine how we are going to do our job with less forces and still maintain, if we in fact want to maintain, that military dominance.
>
> Force packaging, the size of the force, and wrestling right now with what the threat is.

> The ability to project power...what is the mix of force that would have the most effectiveness to be able to do that.
>
> I would say the number one issue is force structure along with--everything is so linked--defining the threat. We have got to analyze what the threat is and change to be able to meet the threat.

One additional feature differentiated the flag officers from the others. Flag officers were more likely to ask a question or mention an unknown variable than were respondents in the other two groups. Forty-two percent of the flag officers' frames of reference contained questions or statements of unknowns, compared with 16% for the regional experts and 6% for the students. Questions and unknowns were usually associated with contingent thinking and parallel processing. For example, in discussing public support in the future and its relationship to financing the development of the industrial base, one flag officer commented,

> What will occur? What's going to happen that will make that national consensus? I don't know. If there is no big threat on the horizon, it may not occur, in which case you will not see the dormancy of the industrial base, you will see the disintegration. It's a problem of national importance.

Actions Frames of Reference

Structure.

Complexity. There were no substantive differences between groups in the number of elements contained in the actions frames of reference. However, the flag officers frames of reference were explicitly interconnected across

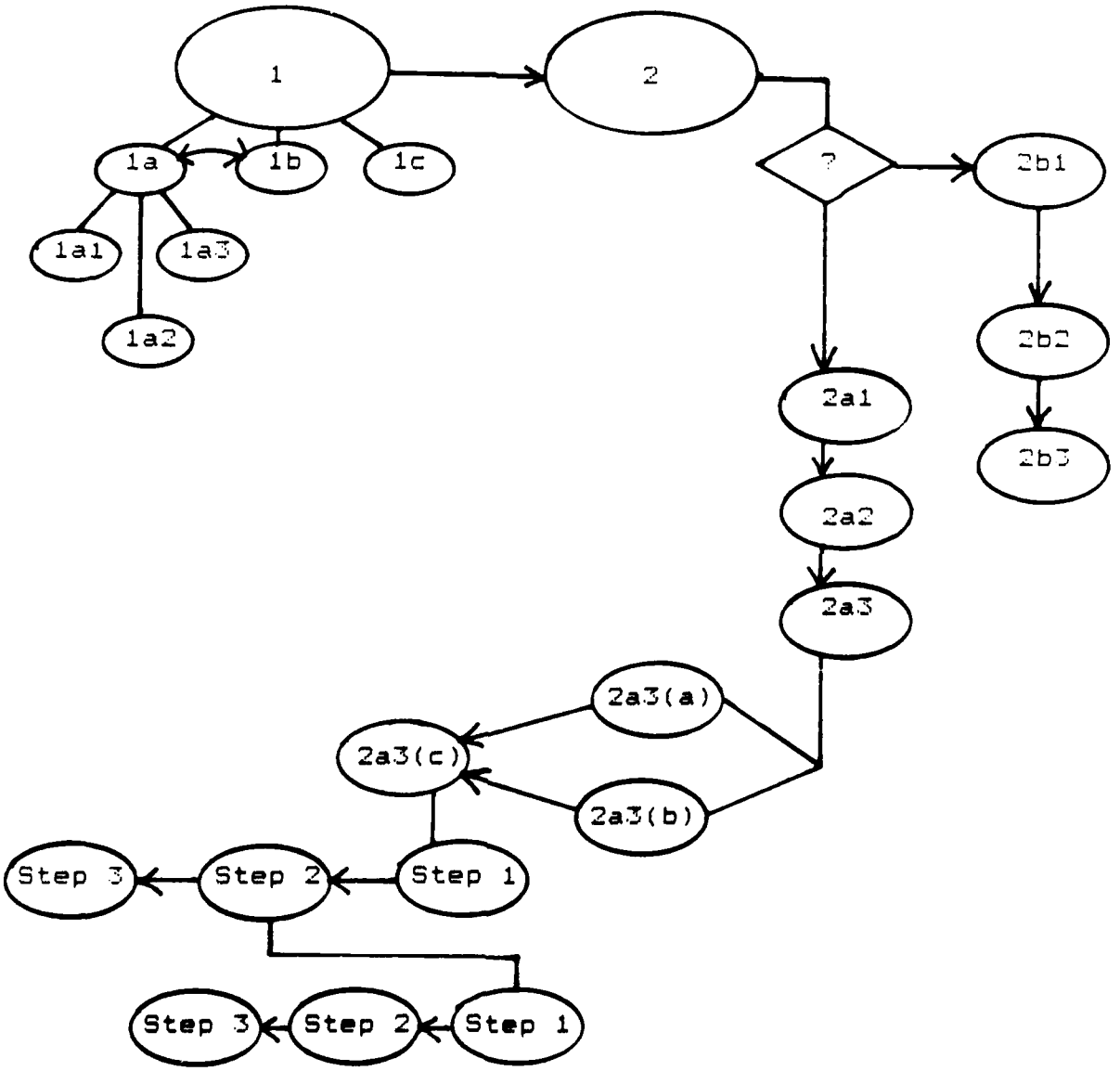
regions/topics (50%). That is, actions explicitly transcended responses to global, regional, and domestic issues and were viewed as part of a larger framework. By comparison, this type of interconnection appeared in only 12% of the frames of reference for both regional experts and students.

Flag officers also were more likely to embed actions within the discussion of issues, thus connecting action frames of reference to issues frames of reference. Thirty-three percent of the action frames of reference were directly linked to issues frames of reference, compared to 1% for the students and zero for the regional experts. This finding supports the idea that experts' knowledge (in this case, the strategic-level leaders) is highly procedural and goal oriented. In fact, the flag officers' actions were more likely to involve generalized procedures and subprocedures for dealing with specific issues. For example, a number of action diagrams looked like computer flow charts with nested subroutines (see Figure 4).

Sophistication. Flag officers' action frames of reference were more sophisticated than those of the other group members. For flag officers, 67% of the action frames of reference contained at least one of the following elements: tradeoffs, contingent thinking, or parallel processing. This compares to 24% for the regional experts and 6% for the students. Since the flag officers' frames of reference overlap across regions/topics, this figure does

Figure 4

Sample Actions Frame of Reference



contain some double counting. The following excerpt from a flag officer discussing actions to deal with global issues illustrates parallel processing:

> In the near term, I think you have to focus on the forces in being to be credible fighting forces to respond to the troubled world we see around us. Because of the size of the Soviet forces you have to be prepared to stand up to them should they do something. In other areas of the world, I would say presence and stability that allows other options...So I think the primary role in the near term is readiness and credibility to maintain the threshold of violence below open conflict. Now in the long range, I think we have to assume a posture that is willing to take more risks...That says I want to selectively jump in R&D technology to a capability that will keep me ahead of the technological advances in warfare... Obviously, since it is a zero-sum declining game, we are going to get smaller and it's going to be difficult in a declining budget environment...So, long term, I think the key will be maintaining a commitment, maybe even an increasing commitment, to research and development and the advances in technology and less of a commitment to always develop and produce technology...All this because I think the all-volunteer armed forces, one as a quality force, is here to stay.

In this example, the respondent goes down two parallel paths, one for the near term and one for the long range. The long range sees the use of advanced technologies as a way to close the gap created by a smaller all-volunteer force. Hence, the long range and the short range actions are integrated. Note the level of abstraction in this excerpt. Actions are represented by abstract concepts such as presence, readiness, credibility, stability, and commitment to technology.

Causal Networks. Finally, in terms of the structure of causal networks, flag officers action frames of reference contained substantially more causal elements. That is, they were more likely to say "I would do X and would expect Y or Z to happen." Eighty-two percent of the flag officers' frames of reference contained causal links, when compared to 44% of the regional experts' and 26% of the students'. This finding suggests that the flag officers are more capable of anticipating second- and third-order effects than are members of the other two groups.

Content. Action categories are presented in Table 3. Eighty percent of the students' action focused on action internal to the military. The bulk of these actions centered on force structure, missions, and education/training/development. Only 6% of the actions dealt with influencing the external environment. In contrast, 66% of the flag officers' actions were internally focused while 28% of their actions were oriented on the external environment. The regional experts' actions fell somewhere between these two groups (74% internal, 11% external). External actions included civil-military integration, representing the military to Congress and the American people, supporting commercial R&D, and maintaining the industrial base. Flag officers tended to have a broader view of the military's contribution to national security, suggesting the appropriateness of less traditional military

Table 3

Content Categories for Actions

Category	Group		
	Students	Regional Experts	Flag Officers
	(percentages)		
Military-Internal	80	74	66
Military-External	6	11	28
Economic	5	6	2
Dipliomatic	5	6	4
Political	4	6	0

roles in addition to warfighting. Consider the following example from one flag officer:

> As an example, we don't need to train six days a week. I could argue in an army that is CONUS-based, that is contingency oriented, you could set up a superb training program with three days training and two days of technical and scholarly and professional development that has nothing to do with the Army...But you see, you've got to link it [a new vision of national security] back to national power, where the economic component is weighted equally. Now I can argue against that. I can argue that it's more important, but that's not my job...My responsibility is to be all I can be, making the Army, the Navy, and the Air Force the best security it can be. But I'm here to tell you, if the senior leaders of the Army, Navy, and Air Force can't get out of that mindset, they are going to be in charge of a very poor army, navy, and air force because it's not going to have the support of the American people. It's going to be a very strong military in a half-baked nation. It is the national basis of power that is more important than the military basis of power.

For actions internal to the military, the flag officers frequently mentioned three concepts related to force structure--versitility, lethality, and flexibility. They tended to link these force structure concepts to resources in the organization's environment. For example, lethality is tied to technology, hence the importance of the U.S. research and development base. The other major category of internal actions related to the development of a national military strategy. In contrast, students' force structure actions were much less focused and they also gave greater weight than did the flag officers to missions and education/training/and development. Not surprisingly, the

regional experts valued the creation of specialty branches and units along with the emphasis on advanced education in regional studies.

These finding are consistent with the content analysis of the issues frames of reference. Flag officers tended to be more oriented on the environment and to be more proactive in their actions, when compared to the students and the regional experts. In addition, the flag officers seemed to be more likely to blur traditional civil-military distinctions. While maintaining a concern with military readiness to deal with a variety of threats, the flag officers appeared to be willing to take on some social engineering missions because they viewed national power in a broader context.

DISCUSSION

The results suggest that there are discernable differences in the structure and content of the frames of reference used by military leaders at different organizational levels to understand future strategic issues. These findings are consistent with the predictions derived from previous research on expertise and from Stratified Systems Theory. The study also extends Stratified Systems Theory research by focusing on a specific task associated with strategic-level leadership.

Structure and Content of the Frames of Reference

Strategic-level leaders tend to have frames of reference that are more interconnected, thus permitting more sophisticated processing when engaged in thinking about future strategic issues. Their frames of reference also tend to be more action oriented and goal directed, with actions linked in cause and effect sequences. This permits the anticipation of second and third order consequences of their actions. In contrast, leaders with experience at lower levels (in this case, officers in transition from the production to the organizational domain) have frames of reference that are less interconnected. Their thinking about strategic issues is not as sophisticated as the more senior officers, perhaps because their frames of reference are not organized to permit consideration of separate, yet interconnected sequences.

Strategic-level leaders are oriented on the organizational environment. They are concerned with securing the external resources and support necessary for the long-term survival of the organization. They have a proactive orientation, looking for ways to shape the future. On the other hand, leaders at lower levels focus more on internal issues and actions. They have a reactive orientation, responding to the demands placed on the organization.

These differences in orientation might be understood in developmental terms. Using a sample of war college

students. Lewis and Jacobs found a relationship between the level of conceptual work capacity (as defined by Jaques)[22] and the level of personal differentiation (as defined by Kegan).[23] Those students who had differentiated themselves from their work to the point where they could view their work environment objectively also tended to show the conceptual capacity to handle strata IV level work. Lewis and Jacobs suggest two possible explanations for their findings.[24] First, a structural capacity may underlie both personal differentiation and current work capacity. Second, independence of thought may be a prerequisite for developing the capacity to handle highly complex work. In the present study, differences in orientation may represent developmental differentiation. Consequently, students may be less able than flag officers to see the organization in broader terms. This explanation merits further empirical study.

The findings also suggest that strategic-level leadership involves more than strategic thinking and envisioning. Strategic-level leadership involves action, implementing programs and policies that will realize the vision. The marked differences in the actions frames of reference between flag officers and students illustrate this point. The flag officers know what levers to manipulate in order to deal with future issues. Their actions are tied together across topical areas (e.g., regional and domestic issues), suggesting the presence of superordinate concepts

around which specific actions are organized. In contrast, the students took discrete actions in response to issues. Their frames of reference show little evidence of an overarching scheme. Furthermore, the frames of reference of the flag officers contrasts with that of the regional experts. Although the experts possess dense, highly interconnected frames of reference that they use to understand future issues, they are less able to generate actions to deal with those issues. Experience at the strategic-level seems to be the key to action, not the possession of technical knowledge.

The results do not point to differences between groups in the number of elements contained in the frames of reference. Time constraints and the open-ended nature of the interview protocol may have made it difficult to pursue fully the scope of the frames of reference. Further probing might have revealed greater differences between the groups in the number of elements. This was not done in order to avoid structuring the respondents' thinking for them.

How do we account for the differences in the frames of reference between the students and the flag officers? One line of reasoning, suggested by SST, is that the findings represent maturational differences based primarily on cognitive potential (an individual difference variable). Support for this explanation requires either an independent measure of cognitive potential, which I did not use, or a theoretical assumption that group membership is a proxy for

cognitive potential, which is illogical in this case because it is plausible that some of the students may, in time, advance to flag rank. An alternative explanation is that the results reflect developmental differences based primarily on experience. This point of view is consistent with the expert-novice literature. It suggests that differences between the groups represent different ways of understanding and responding to the strategic environment that develop from real world experience. It makes sense that strategic-level leaders would demonstrate greater expertise on strategic-level tasks than mid-level leaders. Subsequent research should orient on resolving empricially these competing explanations for the differences between groups.

Although the study focused on differences between groups, there were a few noticeable variations in the frames of reference within the student group that may represent individual differences in potential. Differences involved the level of abstraction of the issues and the level of sophistication in thinking. For example, one student noted three general issues--response to regional conflicts, integration of advanced technologies, and reduction of the available manpower pool--and then grouped them under two more abstract categories--the Army's role in the next ten to twenty years ("what") and continuation of the Army in the future ("how"). In contrast, other students merely listed issues without any sense of superordinate categories.

Experience on high level staffs did not appear to be related to these differences. Further study using measures of conceptual capacity might explain within group variance in terms of individual differences in conceptual potential.

Implications for the Education and the Development of Strategic Leaders

Strategic-level work requires rich, well organized, highly integrated frames of reference containing both conceptual and causal networks that permit sophisticated thinking. The findings of the present study suggest a number of implications for the development of strategic military leaders.

First, professional education can play a role in helping officers to form complex frames of reference. Indeed, during the interviews with the students, it was clear that they were beginning to develop abstract concepts about strategic national security issues that will form the foundation for further development as they gain more experience. Obviously, the more they know about the world, the more they will be able to make sense out of world events and identify relevant issues. The results of the present study highlight the importance building interconnections among elements in the frame of reference. It is not enough simply to expose students to a large amount of information; they must be challenged to organize the information into meaningful categories and to form interconnections among elements. Academic tasks requiring

integration and synthesis aid the development of interconnected frames of reference.

Second, if personal differentiation is associated with the development of sophisticated thinking, then professional education must provide experiences that stretch students beyond their familiar ways of understanding. As Lewis and Jacobs have stated,

> Slow and progressive changes in the way a person constructs their experience occur not primarily as a result of being taught better ways of making sense of the world but instead in response to directly experiencing the limitations of one's current way of making sense of experience. The reason traditional instructional methods typically fail to have an impact on conceptual capacity is that the information presented can typically be assimilated to the student's current cognitive structures.[25]

Hence, students must be exposed to information which can not be easily understood in terms of existing frames of reference. Such stretching may elicit strong emotions as one experiences the failure of comfortable ways of understanding and thinking. But the resulting discomfort provides the motivational foundation for exploring new, more sophisticated ways of approaching the world.

Third, the preceding two implications suggest the requirement for faculty who can design developmental experiences and can assess cognitive capacity and growth. Must one have served in a strategic leadership position to hold a faculty position at the War College? The results of the present study do not provide the answer to this

question. However, faculty selection and preparation clearly merit further attention in light of the findings reported here.

Fourth, the data produced by the study provide rich examples of strategic thinking by senior military officers. Transcripts and frames of reference diagrams can be incorporated into instruction at the War College to illustrate the substance and the structure of strategic thinking.

Fifth, the interview protocol may be useful as an instructional technique. Most students said they enjoyed the interview and expressed a desire to repeat it later on in the course of instruction. Many said they would have been less able to deal with the questions at the start of the course. All said that they were challenged by having to think about such open-ended issues. The interview and diagraming technique, coupled with developmental feedback, might serve as a method for building interconnected frames of reference and as a basis for stimulating sophisticated thinking. It could also be used as part of a program evaluation to chart longitudinal changes in the frames of reference at different points in the curriculum.

Finally, when it comes to long-term development, there is no substitute for challenging work experiences. Professional education opportunities may provide the conceptual foundation, but the frames of reference required for strategic-level leadership are developed on the job.

The differences in the action frames of reference between the regional experts and the flag officers suggest that technical expertise derived from formal education is insufficient by itself. High-level work experience seems to be the key. After graduating from the war college, all the flag officers in the sample served in positions of progressively greater responsibility at successive organizational levels. This finding does not permit the inference of a causal relationship between experience and development; however, it does suggest that experience is a necessary condition. The importance of work experience argues for personnel assignment policies that place war college graduates in positions where their frames of reference can be further developed on the job. Moreover, considerably more research attention must be given to the relative contributions of education and work-related experience to the development of strategic leaders.

APPENDIX A

INTERVIEW QUESTIONS

BACKGROUND INFORMATION

1. What is your branch of service? Alternate specialty?

2. How long have you been in the military service? (years and months)

3. Please summarize your civilian education--degrees, subjects, dates received.

4. Please summarize your military education.

5. What is your current assignment? (For interviewees assigned as students at the U.S. Army War College: What was your previous assignment?).

6. Have you ever been assigned to the Joint Staff, Service Staff, Joint Command Staff, Major Command (3 or 4 star command) Staff?

If so: a. When?

b. To whom did you report?

c. Please describe the principle duties and responsibilities of the position(s) you held.

GENERAL ISSUES FACING THE ARMY IN THE FUTURE

1. What are the most significant strategic issues facing the Army in the next 10 to 20 years?

2. What makes these issues so significant?

3. How should the Army go about posturing itself to face these issues?

PROBES: What needs to be done to face these issues adequately?

Who needs to do it?

What is the timing?

REGIONAL ISSUES FACING THE ARMY IN THE FUTURE

1. Soviet Union and Eastern Europe.

a. Are there particular strategic issues of concern to the U.S. in relation to the Soviet Union and Eastern Europe? If so, what are they?

b. Why do you think these issues are of concern?

c. What do we need to do to prepare ourselves to deal with them?

PROBES (if necessary):

The economic and political revolution in the Soviet Union, coupled with the emergence of non-Communist governments in Eastern Europe, suggests the potential for new regional tensions that may build into theater-size conflicts that threaten U.S. interests.

a. Is this a strategic issue for the U.S. military in the next 10 to 20 years?

b. What makes it so?

c. What do we need to do to prepare the U.S. Army to deal with this issue?

2. Latin America.

a. Are there particular strategic issues of concern to the U.S. in relation to Latin America? If so, what are they?

b. Why do you think these issues are of concern?

c. What do we need to do to prepare ourselves to deal with them?

PROBES (if necessary):

Some futurists have argued that population expansion and lack of economic growth threaten the development and stability of democratic governments in Latin America.

a. Are these strategic issues for the U.S. military in the next 10 to 20 years?

b. What makes them so?

c. What do we need to do to prepare the U.S. Army to deal with this issue?

3. Africa.

a. Are there particular strategic issues of concern to the U.S. in relation to Africa? If so, what are they?

b. Why do you think these issues are of concern?

c. What do we need to do to prepare ourselves to deal with them?

PROBES (if necessary):

U.S. regional interests in Africa include accessing strategic minerals, maintaining U.S. influence and basing facilities, and encouraging economic and democratic development. Threats to these interests include ethnic and boarder conflicts, terrorism, unpredictable political change in South Africa, and spread of the HIV virus among the leadership elite in some countries.

a. Are these significant issues for the U.S. military in Africa in the next 10 to 20 years?

b. Why are these significant issues?

c. What do we need to do to prepare the U.S. Army to deal with this issue?

DOMESTIC ISSUES

1. Are there particular domestic issues of concern to national military strategy? If so, what are they?

2. Why do you think these issues are of concern?

3. What should the Army do to prepare to deal with these issues?

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25. Lewis and Jacobs, p. 29.

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